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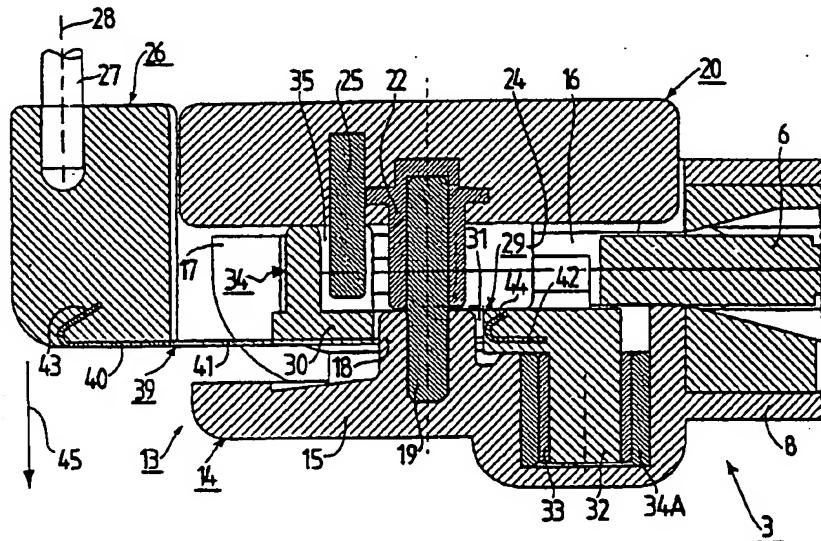
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(54) Title: TOOTHBRUSH HAVING MAIN BRISTLES AND HAVING TRANSVERSELY AND LONGITUDINALLY ADJUSTABLE INTERDENTAL BRISTLES



WO 01/32095 A1

(57) Abstract: A toothbrush (1) has a cleaning member (3) equipped with a drivable bristle holder (20) for holding main bristles (21) and with a drivable interdental bristle holder (26) for holding interdental bristles (27), the interdental bristle holder (26) being coupled to a drive element (29) with the aid of a coupling element (39) and, of the coupling element (39) and the drive element (29) at least the coupling element (39) is at least partly elastically deformable parallel to the longitudinal bristle direction (28) of the interdental bristles (27) held by the interdental bristle holder (26).

Toothbrush having main bristles and having transversely and longitudinally adjustable interdental bristles

The invention relates to a toothbrush as defined in the opening part of claim 1.

The invention further relates to a cleaning member as defined in the opening part of claim 7.

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A toothbrush of the type defined in the opening part of claim 1 and a cleaning member of the type defined in the opening part of claim 7 are known from the patent document US 5,836,030 A. Such a toothbrush has been put on the market by the Applicant 10 and has proved to be comparatively successful. In order to obtain a satisfactory overall cleaning result with such a toothbrush, as well as with any other toothbrush, it is very important to achieve a good cleaning action in the interdental areas. In this respect it has proved to be unfavorable with the known toothbrush and with the known cleaning member 15 that the second coupling element and the second drive element are of a stiff construction and consequently form a more or less rigid unit.

It is an object of the invention to provide an improved cleaning action in a simple manner and by simple means both at the main dental areas and in the interdental areas 20 and thus achieve an improved overall cleaning result with a toothbrush as defined in the opening part of claim 1 and with a cleaning member as defined in the opening part of claim 7.

According to the invention, in order to achieve the afore-mentioned object, the characteristic feature defined in the characterizing part of claim 1 is provided in a toothbrush 25 of the type defined in the opening part of claim 1.

According to the invention, in order to achieve the afore-mentioned object, the characteristic feature defined in the characterizing part of claim 7 is provided in a toothbrush of the type defined in the opening part of claim 7.

By providing the characteristic feature in accordance with the invention an improved cleaning action is achieved at the main tooth areas with a toothbrush in accordance with the invention and with a cleaning member in accordance with the invention, because at these areas the mostly longer interdental bristles recede and, as a result of this, both the 5 interdental bristles and the main bristles, which are disposed directly adjacent the interdental bristles, are capable of providing an intensive cleaning contribution, and also an improved cleaning action in the interdental areas is achieved because the interdental bristles perform not only a movement substantially parallel to the interdental areas but, in addition, can also perform a movement perpendicularly to the interdental areas and perpendicularly to the main 10 tooth areas. In this respect it is very essential that the afore-mentioned additional movement of the interdental bristles is independent of the relative position of the interdental bristle holder with respect to the bristle holder, as a result of which the interdental bristle holder and, consequently, the interdental bristles can perform a movement which is oriented substantially 15 parallel to the longitudinal bristle-direction of the interdental bristles, also in the case that the interdental bristle holder is pivotable owing to the elastic deformability of at least the second coupling element and, when applicable, also of the second drive element, because in this case a comparatively large pivoting radius, i.e. a comparatively long lever arm, which is independent of the relative position with respect to the bristle holder, can be obtained for the 20 interdental bristle holder.

It is to be noted that from the patent document WO 97/07707 A1 a toothbrush is known in which a bristle holder and an interdental bristle holder have been provided but in which neither the bristle holder nor the interdental bristle holder is drivable with the aid of drive elements of drive means and in which the interdental bristle holder is connected directly to the bristle holder. Although in this case the connection between the bristle holder and the 25 interdental bristle holder is elastically deformable, the interdental bristle holder can perform only a pivotal movement defined by the elastically deformable connection between the bristle holder and the interdental bristle holder, i.e. a pivotal movement which is dependent on the relative position of the interdental bristle holder with respect to the bristle holder, in other words a pivotal movement having only a comparatively small pivoting radius, i.e. a 30 comparatively short lever arm, which is less favorable for the cleaning of the interdental areas because the interdental bristles perform not only a movement substantially parallel to the longitudinal brush-direction of the interdental bristles but, with their free ends, also a movement oriented transversely to the longitudinal brush-direction of the interdental bristles

and transversely to the interdental areas, which is less favorable for a deep cleaning of the interdental areas.

Both the second coupling element and the second drive element of a toothbrush and a cleaning member in accordance with the invention can be of an elastically deformable construction, which is particularly favorable in order to obtain a lever arm of maximal length. However, it has proved to be very advantageous when, in addition, the characteristic features as defined in claim 2 and in claim 8, respectively are provided in a toothbrush and a cleaning member in accordance with the invention. This has proved to be particularly advantageous in view of a construction which is as simple and reliable as possible.

Moreover, it has proved to be very advantageous when, in addition, the characteristic features as defined in claims 3 and 4 and in claims 9 and 10 are provided. This has proved to be very favorable in view of a construction which is as simple and reliable as possible.

However, it has also proved to be very advantageous when, in addition, the characteristic features as defined in claims 5 and 6 and in claims 11 and 12 are provided. This enables a solution that is particularly favorable with regard to the pivotal movement of the interdental bristle holder to be realized because the flexural element guarantees stability and the soft component surrounding the flexural element damps the deflection movements in an advantageous manner.

The above-mentioned as well as further aspects of the invention will become apparent from the two embodiments described hereinafter by way of example and will be elucidated with reference to these two examples.

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The invention will now be described in more detail with reference to the drawings, which show two embodiments given by way of example but to which the invention is not limited.

Fig. 1 is a plan view which shows the relevant part of a toothbrush in accordance with a first embodiment of the invention, which toothbrush has a cleaning member in accordance with a first embodiment of the invention.

Fig. 2 is an exploded view which shows the cleaning member of the toothbrush shown in Fig. 1.

Fig. 3 is a sectional view taken at the location of the free end of the cleaning member shown in Fig. 2.

Fig. 4 shows, in the same way as Fig. 1, a toothbrush in accordance with a second embodiment of the invention, which toothbrush has a cleaning member in accordance with a second embodiment of the invention.

Fig. 5 shows, in the same way as Fig. 2, the cleaning member of the toothbrush shown in Fig. 4.

Fig. 6 shows, in the same way as Fig. 3, the area of the free end of the cleaning member shown in Fig. 5.

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Fig. 1 shows a part of a toothbrush 1. The toothbrush 1 comprises a grip member 2, which is shown in Fig. 1 only, and a cleaning member 3 connected to the grip member 3. The cleaning member 3 extends parallel to a longitudinal direction 4 of the cleaning member, which direction is shown as the longitudinal axis 4 of the cleaning member 3 in Figs. 1 and 2.

The toothbrush 1 has drive means 5, which are accommodated partly in the grip member 2 and partly in the cleaning member 3. For the construction of the drive means 5 reference is made to the patent document US 5,836,030 A. The subject matter disclosed in said patent document is incorporated herein by the reference to said document. The part of the drive means 5 of the toothbrush 1 shown partly in Fig. 1, which is accommodated in the cleaning member 2, is wholly identical to the drive means described in the patent document US 5,836,030 A.

The part of the drive means 5 accommodated in the cleaning member 3 comprises a connecting rod 6 which is reciprocatingly drivable parallel to the longitudinal direction 4 of the cleaning member. The connecting rod 6 is equipped with a first drive element 7 in the area of its free end. In the present case the first drive element 7 consists of a drive socket.

The cleaning member 3 is made of a plastic and is essentially tubular. The cleaning member 3 has a tubular portion 8. In the area of the end 9 of the cleaning member 3, which end faces the grip member 2, the cleaning member 3 has a coupling portion 10 which is integral with the tubular portion 8 provided and adapted to couple the cleaning member 3 to the grip member 2. The coupling portion 10 carries an indicator ring 11 which is locked by means of a retaining ring 11. At the end 13 of the cleaning member 3, which end is remote

from the grip member 2, the cleaning member 3 has a head portion 14 which is essentially pot-shaped. As is apparent from Fig. 1 - in which a bristle holder 30 including main bristles 21 is not shown - the head portion 14 has a pot bottom wall 15 and a circumferential pot wall 16. In the area of the end which is remote from the tubular portion 8 the circumferential pot wall 16 has an aperture 17, the purpose of which will be described hereinafter.

As is apparent from Fig. 3, a bearing sleeve 18 projects from the pot bottom wall 15 of the head portion 14 and is integral with the head portion 14. A metal bearing spindle 19 is a press-fit in the bearing sleeve 18.

The cleaning member 3 is equipped with a drivable bristle holder 20, which 10 carries a plurality of main bristles 21, which for the sake of simplicity are not shown in Fig. 3. The bristle holder 20 consists of a plastic. A bearing sleeve 22 is connected to the bristle holder 20, the connection between the bearing sleeve 22 and the bristle holder 20 being formed by molding around the bearing sleeve 22. The bearing sleeve 22 projects from the bristle holder 20 towards the head portion 14 and is mounted on the bearing spindle 19, a 15 reciprocating movement in tangential directions being possible between the bearing spindle 19 and the bearing sleeve 22. Locking hooks, not shown, project from the bristle holder 20 in radial directions and engage a circumferential groove, not shown either, in the circumferential pot wall 16, thereby locking the bristle holder 20 in axial directions.

Further, a coupling pin, which extends parallel to the bearing sleeve 22, 20 projects from the bristle holder 20 towards the head portion 14 and forms a first coupling element 23 of the cleaning member 3. The coupling pin forming the first coupling element 23 projects into the drive socket which forms the first drive element 7 of the cleaning member 3. Thus, the bristle holder 20 is coupled to the first drive element 7 and, consequently, to the drive means 5 with the aid of the first coupling element 23.

25 Further, a hold-down ring 24, which extends parallel to the bearing sleeve 22 and to the coupling pin forming the first coupling element 23, projects from the bristle holder 20 towards the head portion 14 and serves to hold down a second drive element for driving an interdental bristle holder, as will be described in more detail hereinafter.

Further, a drive pin 25 projects from the bristle holder 20 towards the head portion 14, which 30 drive pin is connected to the bristle holder 20 by molding and forms part of the drive means 5, its purpose being described hereinafter.

The cleaning member 3 is further equipped with a drivable interdental bristle holder 26, which carries a plurality of interdental bristles 27, which extend parallel to a longitudinal bristle-direction 28, which is oriented transversely to the longitudinal direction 4

of the cleaning member. For the sake of simplicity the interdental bristles 27 are merely indicated in Fig. 3. In order to drive the interdental bristle holder 26 the cleaning member 3 has a second drive element 29. The second drive element 29 has a drive disc 30 having a central slot 31 which is engaged the bearing sleeve 18, which projects from the head portion 14, without the actuating movement of the drive disc 30 and, consequently, of the second drive element 29 being impaired. A bearing pin 32 projects from the drive disc 30 in a direction towards the pot bottom wall 15 of the head portion 14 in the disc area which faces the tubular portion 8. A first bearing sleeve 33 is a press-fit on the bearing pin 32. The first bearing sleeve 33 cooperates with a stationary second bearing sleeve 34A, which second bearing sleeve 34A is locked in rotation to the head portion 14 of the cleaning member 3 by molding. A relative movement in tangential directions is possible between the bearing sleeve 33 and the second bearing sleeve 34A, thus enabling a reciprocatory pivotal movement to be performed by the second drive element 29. The second drive element 29 is axially positioned with the aid of the head portion 14 and with the aid of the hold-down ring 24.

15 A coupling member 34, which is U-shaped in plan view, projects from the drive disc 30 in its area which is remote from the tubular portion 8, which coupling member is integral with the drive disc 30 and has two limb walls 35 and 36. The drive pin 25, which projects from the bristle holder 20, engages between the two limb walls 35 and 36.

When the drive means 5 are driven during operation of the toothbrush 1 this causes the connecting rod 6 to be reciprocated parallel to the longitudinal direction 4 of cleaning member. As a result of this, the first coupling element 23, i.e. the coupling pin, is reciprocated via the first drive element 7, i.e. via the drive socket, as a result of which the bristle holder 20 and, consequently, the main bristles carried by this holder perform a reciprocatory movement as indicated by the double arrow 37 (see Fig. 1). The pivotal movement of the bristle holder 20 causes the drive pin 25 to also perform a corresponding pivotal movement, which the drive pin 25 imparts to the drive disc 30, and hence to the second drive element 29, via the coupling member 34, i.e. via the two limb walls 35 and 36 of the coupling member 34. As a result of this, the second drive element 29 performs a reciprocatory pivotal movement as indicated by the double arrow 38 (see Fig. 1) about the second bearing sleeve 34, which in its turn causes the interdental bristle holder 28 to also perform a reciprocatory pivotal movement as indicated by the double arrow 38, because the interdental bristle holder 26 is coupled to the second drive element 29 with the aid of a second coupling element 39, which extends through the aperture 17 in the circumferential pot wall 16.

In the case of the toothbrush 1 shown in Fig. 1 and the cleaning member 3 of this toothbrush 1 the construction in the area of the bristle holder 20 and in the area of the interdental bristle holder 26 is such that both the second coupling element 39 and the second drive element 29 are partly elastically deformable substantially parallel to the longitudinal bristle direction 28 of the interdental bristles 27. In the present case the second coupling element 39 is formed by a metal blade spring configuration. The blade spring configuration provided as the second coupling element 39 has a first end portion 40, an intermediate portion 41, and a second end portion 42. The interdental bristle holder 26 is fixedly connected to the first end portion 40. The second drive element 29, i.e. the drive disc 30 of the second drive element 29, is fixedly connected to the second end portion 42. The connection between the first end portion 40 and the interdental bristle holder 26, which consists of a plastic, is formed by an injection-molded connection. In order to improve the reliability of the injection-molded connection between the interdental bristle holder 26 and the first end portion 40 the blade spring configuration has a first bent portion 43 in the area of the first end portion 40. The connection between the second end portion 42 of the blade spring configuration forming the second coupling element 39 and the second drive element 29 is likewise formed by an injection-molded connection. In order to improve the reliability of the injection-molded connection formed by molding around the second end portion 42 the blade spring configuration has a second bent portion 44 in the area of the second end portion 42.

In the construction shown in Fig. 3 the second drive element is very stable and rigid in the area of the connection between the bearing pin 32 and the drive disc 30, and the second drive element 29 is elastically deformable parallel to the longitudinal bristle direction 28 in the area in which the slot 31 is situated, as a result of which the drive disc 30 can deflect in the direction indicated by an arrow 45 in its area where it carries the coupling member 34, in which case the drive disc 30 is deformed elastically. Furthermore, the blade spring configuration forming the second coupling element 39 can readily deform elastically, particularly in its central portion 41, as a result of which a suitable deflection in the direction indicated by the arrow 45 is achieved in this area. This deflection is limited in that the central portion 41 abuts against the pot bottom wall 15 of the head portion 14.

As a result of the afore-mentioned elastic deformability of the second drive element 29 and of the blade spring configuration forming the second coupling element 39 in portions of these two elements 29 and 39, it is achieved that the interdental bristle holder 26 and, consequently, the interdental bristles 27 carried by this holder are movable in the

direction indicated by the arrow 45 and the interdental bristles 27 can thus perform movement substantially parallel to its longitudinal bristle direction 28, which movement is essentially a pivotal movement performed with a comparatively large lever arm. Such a pivotal movement capability of the interdental bristles 27 has proved to be very advantageous
5 in view of a proper cleaning action both in the area of the lateral main tooth surfaces and in the area of the interdental spaces between these lateral main tooth surfaces.

Fig. 4 shows, in the same way as Fig. 1, a part of a toothbrush 1. The toothbrush 1 shown in Fig. 4 is of the same construction as the toothbrush 1 in Fig. 1 as regards the grip member 2 and as regards the tubular portion 8 and the coupling portion 10 of
10 the cleaning member 3.

As is apparent from Fig. 6, the construction of the mounting arrangement of the bristle holder 20 and the mounting arrangement of the second drive element 29 in the toothbrush 1 as shown in Fig. 4 are different from those in the toothbrush as shown in Fig. 1.

In the present case, the bristle holder 20 has a sleeve-shaped projection 49 and
15 a bore 50 which traverses the bristle holder 20 and the projection 49 and which is stepped in the area of its end which faces the main bristles 21. A bearing sleeve 51 engages in the bore 50 and is curved at its end which faces the head portion 14. A metal bearing pin 52 extends through the bearing sleeve 51 and is secured in the head portion 14 by a press-fit. A tangential reciprocatory movement is possible between the bearing pin 52 and the bearing
20 sleeve 51.

In the same way as in the case of the cleaning member 3 shown in Fig. 3, the second drive element 29 has a drive disc 30. The drive disc 30 also has a bearing pin 32 which is integral with it. The bearing pin 32 is reciprocatingly movable in tangential directions with respect to a bearing sleeve 34A. The bearing sleeve 34A is immobilized in the
25 head portion 14 by molding.

The second drive element 29 also has a coupling member 34, which in the present case is formed by two projections 53 and 54 which extend from the drive disc 30 towards the bristle holder 20. The drive pin 25 engages between the two projections 53 and 54.

30 In the embodiment shown in Figs. 4, 5 and 6 the second drive element 29, the second coupling element 39 and the interdental bristle holder 26 form an integral part made of a comparatively hard plastic. The second coupling element 39 takes the form of a bending element. The bending element forming the second coupling element 39 has a first end 55 and a second end 56. In the area of the first end 55 the bending element is integral with the

interdental bristle holder 26. In the area of the second end 56 the bending element is fixedly connected to the two projections 53 and 54 of the coupling member 34, so that in this way the bending element forming the second coupling member 39 is fixedly connected to the drive disc 30, and consequently to the second drive element 29, via the projections 53 and 54.

5 The bending element forming the second coupling element 39 is embedded in a cover of a comparatively soft plastic. For securely connecting the cover 57 to the second coupling element 39 a total of three projections 58, 59 and 60 project from the second coupling element 39 and are substantially cylindrical. Thus, an interlocking connection to the cover 57 is realized by means of the three projections 58, 59 and 60. The third projection 60 at the same time constitutes a limiting stop, which cooperates with a stop surface 61 on the head portion 14 and thus limits a movement of the interdental bristle holder 26 in the direction indicated by the arrow 45. In the present case the cover 57 in addition has a cap-shaped extension 62, which covers a part of the interdental bristle holder 26 and which has a bent portion 64 in the area of its free end 63. The bent portion 64 also forms an interlocking connection, so that altogether the cover 57 is retained properly and reliably.

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It is to be noted that the comparatively hard plastic of which the second drive element 29, the second coupling element 39 and the interdental bristle holder 26 are made is polyoxymethylene. The comparatively soft plastic of which the cover 57 is made is a thermoplastic elastomer.

20 In the embodiment of the toothbrush 1 shown in Fig. 4 and of the cleaning member 3 shown in Figs. 5 and 6 the movement of the interdental bristle holder 26 in the direction indicated by the arrow 45 is achieved by virtue of the partly elastic deformability of two parts, namely the elastic deformability of the second coupling element 39 formed by the bending element and also the elastic deformability of the drive disc 30, namely in the area 25 where the two projections 53 and 54 are connected to the drive disc 30. In this embodiment this also results in a comparatively long lever arm for the movement of the interdental bristle holder 26 in the direction indicated by the arrow 45.

CLAIMS:

1. A toothbrush (1)
having a grip member (2) and
having a cleaning member (3), which is connected to the grip member (2) and
which extends substantially parallel to a cleaning-member longitudinal direction (4), and
5 having drive means (5), which are partly accommodated in the grip member (2) and partly in the cleaning member (3) and which include a drivable first drive element (7) and a drivable second drive element (29) in the cleaning member (3) in the area of that end (13) of the cleaning member (3) which is remote from the grip member (2), and
having a drivable bristle holder (20), which holds a plurality of main bristles
10 (21) and which is coupled to the first drive element (7) with the aid of a first coupling element (23), and having a drivable interdental bristle holder (26), which holds a plurality of interdental bristles (27) which extend substantially parallel to a longitudinal bristle direction (28), which is oriented transversely to the cleaning-member longitudinal direction (4), and
which is coupled to the second drive element (29) with the aid of a second coupling element
15 (39),
characterized in that,
of the second coupling element (39) and the second drive element (29), at least
the second coupling element (39) is at least partly elastically deformable substantially parallel
to the longitudinal bristle direction (28) of the interdental bristles (27).
20
2. A toothbrush (1) as claimed in claim 1, characterized in that
the second coupling element (39) is formed by a metal blade spring
configuration having a first end portion (40), an intermediate portion (41) and a second end portion (42), and
25 the interdental bristle holder (26) is connected to the first end portion (40), and
the second drive element (29) is connected to the second end portion (42).
3. A toothbrush (1) as claimed in claim 2, characterized in that
the second drive element (29) consists of a plastic, and

the connection between the second end portion (42) and the second drive element (29) is formed by an injection-molded connection.

4. A toothbrush (1) as claimed in claim 2, characterized in that
5 the interdental bristle holder (26) consists of a plastic, and
the connection between the first end portion (40) and the interdental bristle holder (26) is formed by an injection-molded connection.

5. A toothbrush (1) as claimed in claim 1, characterized in that
10 the second drive element (29) and the second coupling element (39) as well as the interdental bristle holder (26) consist of an integral part made of a comparatively hard plastic, and
the second coupling element (39) is constructed as a bending element, and
at least the second coupling element (39) is embedded in a cover (57) which
15 consists of a comparatively soft plastic.

6. A toothbrush (1) as claimed in claim 5, characterized in that
the comparatively hard plastic is polyoxymethylene, and
the comparatively soft plastic is a thermoplastic elastomer.

20 7. A cleaning member (3) for a toothbrush (1),
which cleaning member extends substantially parallel to a cleaning-member longitudinal direction (4), and
which has drive means (5), which include a drivable first drive element (7) and
25 a drivable second drive element (29) in the area of one end (13) of the cleaning member (3),
and
which has a drivable bristle holder (20), which holds a plurality of main bristles (21) and which is coupled to the first drive element (7) with the aid of a first coupling element (23), and

30 which has a drivable interdental bristle holder (26), which holds a plurality of interdental bristles (27) which extend substantially parallel to a longitudinal bristle direction (28), which is oriented transversely to the cleaning-member longitudinal direction (4), and which is coupled to the second drive element (29) with the aid of a second coupling element (39),

characterized in that,

of the second coupling element (39) and the second drive element (29), at least the second coupling element (39) is at least partly elastically deformable substantially parallel to the longitudinal bristle direction (28) of the interdental bristles (27).

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8. A cleaning member as claimed in claim 7, characterized in that the second coupling element (39) is formed by a metal blade spring configuration having a first end portion (40), an intermediate portion (41) and a second end portion (42), and

10 the interdental bristle holder (26) is connected to the first end portion (40), and the second drive element (29) is connected to the second end portion (42).

15 9. A cleaning member as claimed in claim 8, characterized in that the second drive element (29) consists of a plastic, and the connection between the second end portion (42) and the second drive element (29) is formed by an injection-molded connection.

10. A cleaning member as claimed in claim 8, characterized in that the interdental bristle holder (26) consists of a plastic, and the connection between the first end portion (40) and the interdental bristle holder (26) is formed by an injection-molded connection.

11. A cleaning member as claimed in claim 7, characterized in that the second drive element (29) and the second coupling element (39) as well as the interdental bristle holder (26) consist of an integral part made of a comparatively hard plastic, and the second coupling element (39) is constructed as a bending element, and at least the second coupling element (39) is embedded in a cover (57) which consists of a comparatively soft plastic.

30

12. A cleaning member as claimed in claim 11, characterized in that the comparatively hard plastic is polyoxymethylene; and the comparatively soft plastic is a thermoplastic elastomer.

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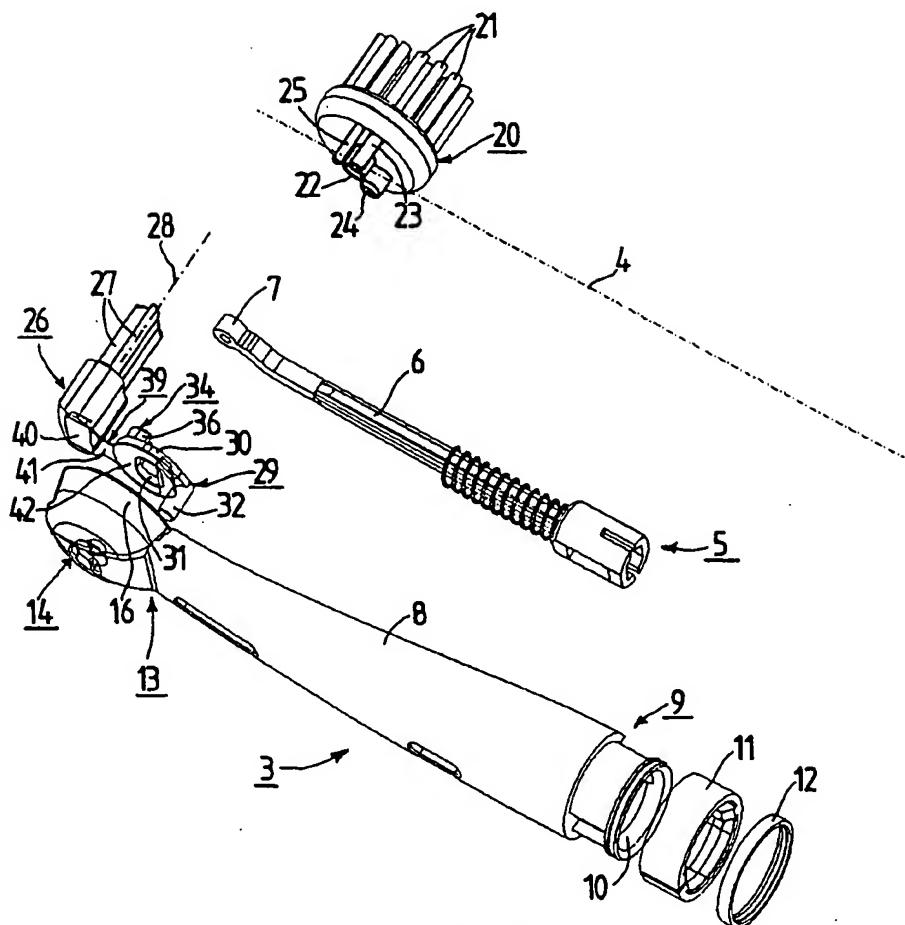


FIG.2

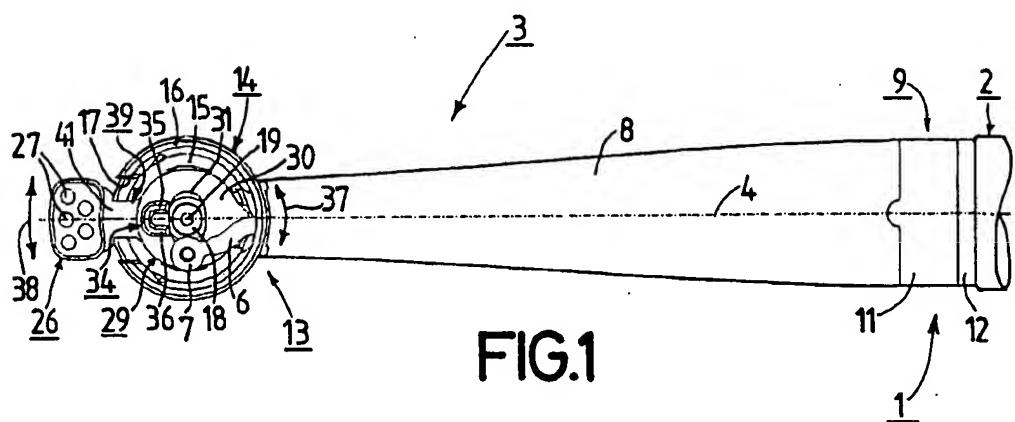
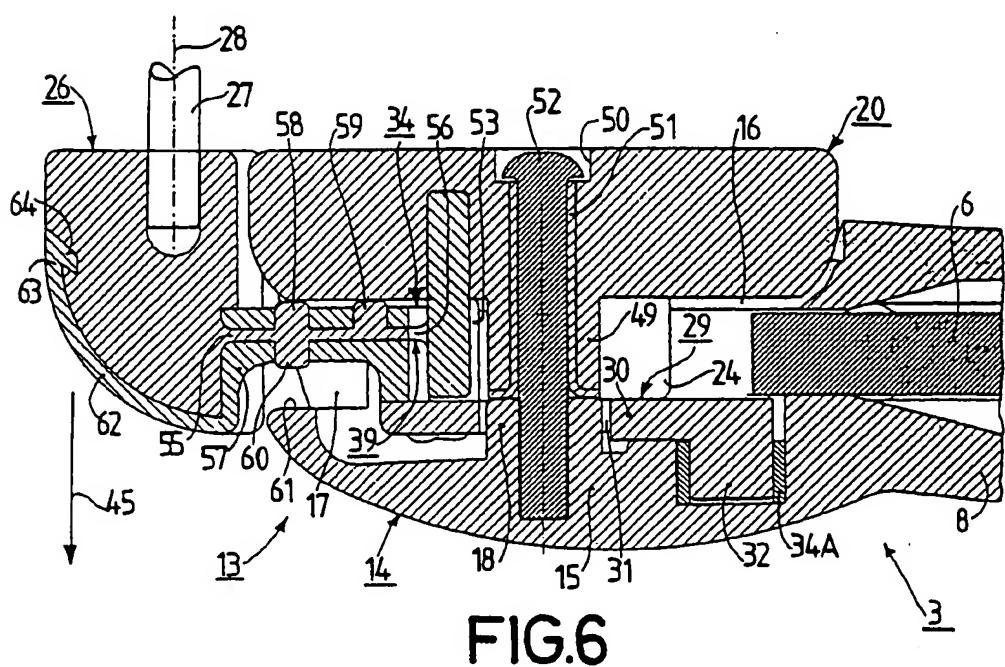
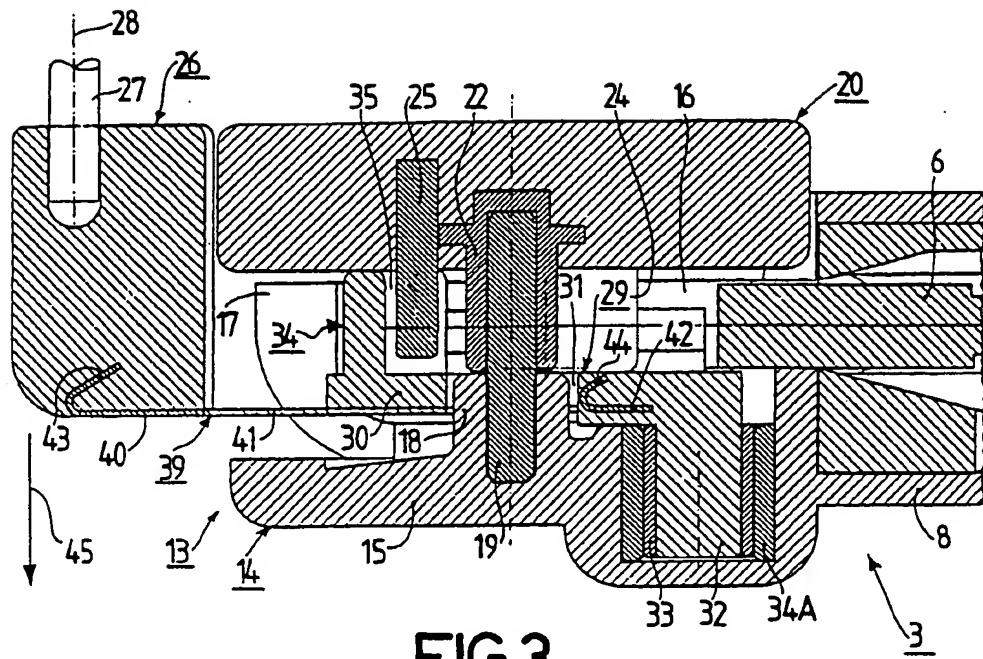


FIG.1

2/3



3/3

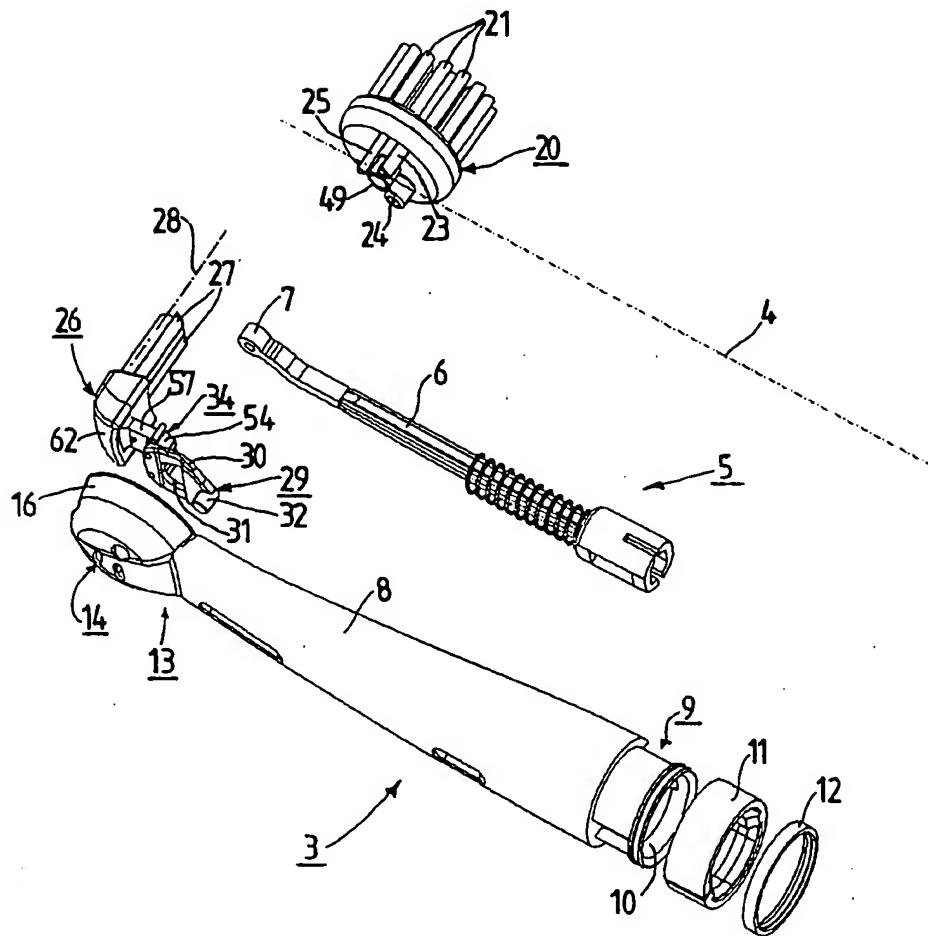


FIG.5

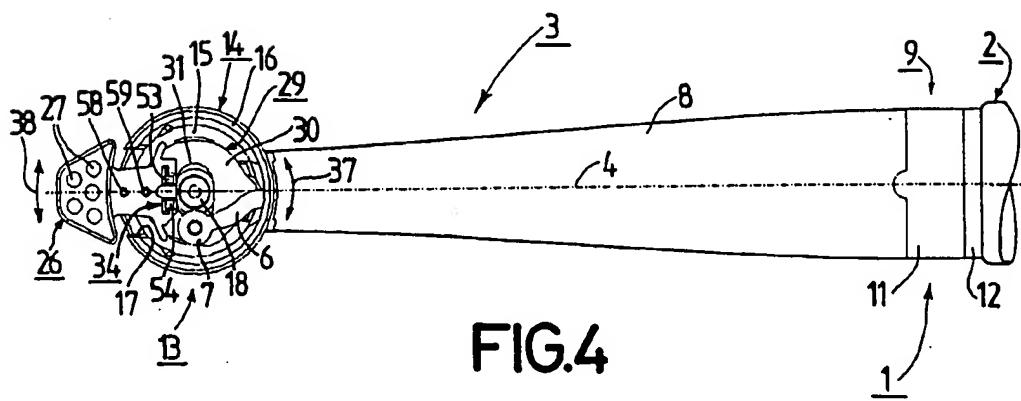


FIG.4

INTERNATIONAL SEARCH REPORT

Int'l. Application No
PCT/EP 00/10007

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61C17/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 836 030 A (HAZEU) 17 November 1998 (1998-11-17) cited in the application the whole document -----	1,7

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

23 January 2001

Date of mailing of the international search report

30/01/2001

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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